

TRAUMATIC BRAIN INJURIES IN MASSACHUSETTS: DATA SUMMARY

Prepared By: The Injury Surveillance Program, Massachusetts Department of Public Health

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The Public Health Importance of Traumatic Brain Injury (TBI):

Each year in the United States at least 1.4 million people sustain a TBI.² This is 8 times the number of people diagnosed with breast cancer and 34 times the number of new cases of HIV/AIDS.³ Of those who sustain a TBI, about 50,000 die, 235,000 are hospitalized and 1.1 million are treated and released from an emergency department.² In the U.S. in 1995, direct and indirect costs of TBI totaled an estimated \$56.3 billion.⁴

Definition of a Traumatic Brain Injury:

An injury to the head arising from blunt or penetrating trauma or from acceleration-deceleration forces that is associated with any of these symptoms or signs attributable to the injury: decreased level of consciousness, amnesia, other neurologic or neuropsychologic abnormalities, skull fracture, diagnosed intracranial lesions, or death.¹

The majority of individuals who sustain a moderate or severe TBI experience significant physical, behavioral/psychiatric, psychosocial, cognitive, and medical problems.⁵ These health problems negatively impact functional independence, community access and living skills, vocational outcomes, and psychosocial development, which may extend throughout a lifetime. Research has shown that TBI can contribute to an increase in high school dropout rates, unemployment, risk for substance abuse, psychiatric hospitalizations including suicide attempts, and criminal activity.⁵

Most TBIs are preventable. Because the sequence of events leading up to these injuries frequently follow a predictable pattern, points for intervention are possible. Prevention of these injuries often requires a multi-faceted approach involving education, enactment and enforcement of laws, and modifications in the environment where injuries occur.

Massachusetts TBI Data Sources and Method Notes:

Statewide Deaths: MA Registry of Vital Records and Statistics, MA Department of Public Health; data reported are for calendar years January 1, 1995 – December 31, 2002.

Statewide Acute-care Hospitalizations: MA Hospital Discharge Database, MA Division of Health Care Finance and Policy; data reported are for fiscal years (FY) October 1, 1995 – September 30, 2003. Deaths occurring during the hospital stay and transfers to another acute care facility were excluded. All hospitalizations and charges discussed refer to acute care hospitals.

Statewide Emergency Department Visits at Acute-care Hospitals: MA Emergency Department Discharge Database, MA Division of Health Care Finance and Policy; data reported are for FY October 1, 2002 – September, 30, 2003. Deaths occurring during the visit were excluded.

Population Data: Population numbers used to calculate rates include estimates provided by the Massachusetts Institute for Statistics and Economic Research (1995-1998 data), DPH estimates for 1999, 2000 Census file, and estimates provided by the U.S. Census Bureau (2001-2003 data).

Rates: All rates are per 100,000. Rates for age groups are age-specific rates. All other rates are crude rates unless otherwise specified.

TBI-related cases were ascertained according to case definitions recommended by the Centers for Disease Control and Prevention and are based upon International Classification of Disease-Version

9-Clinical Modification (ICD-9-CM) codes for morbidity and International Classification of Disease Version 9 (ICD-9, 1995-1998) and Version 10 (ICD-10, 1999-2002) codes for mortality.⁶

With the exception of trend data, the MA TBI data presented in this bulletin represents the most currently available data (2002 deaths and FY 2003 hospitalizations and emergency department visits).

Recent Massachusetts TBI Statistics:

Magnitude:

- In 2002, there were 530 TBI-related deaths (rate 8.2 per 100,000). In FY 2003, there were 4,605 hospitalizations and 36,013 emergency department (ED) discharges associated with a non-fatal TBI among Massachusetts residents (71.6 and 559.8 per 100,000, respectively).

Leading Cause and Intent of TBI:

- The leading cause of TBI-related deaths, hospitalizations, and ED visits is a fall (representing 32%, 53%, and 43% of all cases, respectively).
- Most TBIs in Massachusetts are unintentional ("accidentally inflicted"). Among 2002 TBI-related deaths, 67% were unintentional, 18% were suicides, and 11% were homicides. Among 2003 TBI-related hospitalizations and emergency department visits, 90% were unintentional and 8% were due to an assault.

Age, Sex, and Racial/Ethnic Groups with the Highest Rates of TBI:

- TBI-related death and hospitalization rates are highest among individuals 85 years and older (54.5 and 495.6 per 100,000, respectively). TBI-related ED visit rates are highest among infants less than 1 year of age (1,502.1 per 100,000); the leading cause of the visits among infants is falls.
- Males have higher rates of TBI-related death, hospitalizations and ED visits, compared with females (rates of 12.6 vs. 4.2, 85.3 vs. 58.8, and 650.1 vs. 475.1 per 100,000, respectively).
- Age-adjusted TBI-related death rates were highest among Hispanic and Asian residents (10.6 per 100,000 compared with 10.0 and 7.6 per 100,000 among Black non-Hispanics and White non-Hispanics, respectively).
- Age-adjusted TBI-related hospitalization rates were highest among Black residents (93.4 per 100,000 compared with 80.6, 64.2, and 32.2 per 100,000 among Hispanic, White, and Asian residents respectively).

Total Hospital Charges for TBI-Related Discharges:

- The total hospital charges for TBI in 2003 exceeded \$132 million with 51% of these charges paid through public sources. Statewide ED visit charges during the same year exceeded \$52 million of which 27% were paid through public sources.

Table 1. Summary of MA TBI Data

	Deaths, 2002 (N=530)			Hospital Discharges**, 2003 (N=4,605)			Emergency Department Visits**, 2003 (N=36,013)		
Leading Causes:		Number	Percent		Number	Percent		Number	Percent
	Fall	168	32%	Fall	2,449	53%	Fall	15,570	43%
	Firearm	120	23%	MV Occupant*	947	21%	Struck by/Against	9,034	25%
	MV Occupant*	113	21%	Struck by/Against	354	8%	MV Occupant*	6,566	18%
Highest Rate:		Number	Rate		Number	Rate		Number	Rate
Sex	Male	390	12.6	Male	2,652	85.3	Male	20,222	650.1
Race/Ethnicity	Hispanic & Asian	33/17	10.6	Black	267	93.4	Black	2588	734.1
Age Group	85+ years	68	54.5	85+ years	635	495.6	< 1 year	1283	1502.1

*Motor vehicle occupant includes occupants, motorcyclists, and unspecified persons injured in a motor vehicle traffic related crash.

**Nonfatal cases.

Recent Trends:

The number of TBI deaths among MA residents remained relatively stable from 1995 to 2002 (N=527, rate 8.6 per 100,000 and N=530, rate 8.2 per 100,000, respectively). However, while some causes of TBI-related death (i.e. firearms) have declined, others such as motor-vehicle occupant and fall-related TBI deaths have increased.

From 1995 to 2002:

- The number of firearm-related TBI deaths decreased 24 percent (N=158, rate 2.6 per 100,000 and N=120, rate 1.9 per 100,000, respectively).
- The number of fall-related TBI deaths increased 77 percent (N=95, rate 1.5 per 100,000 and N=168, rate 2.6 per 100,000, respectively). The number of motor-vehicle occupant TBI deaths increased 47 percent (N=77, rate 1.3 per 100,000 and N=113, rate 1.8 per 100,000, respectively).

The number of hospitalizations for non-fatal TBI in MA increased 24 percent from 1995 to 2003 (N=3,728, rate 60.7 per 100,000 and N=4,605, rate 71.6 per 100,000, respectively).

From 1995 to 2003:

- The number of hospitalizations for fall-related TBIs increased 64 percent (N=1,500, rate 24.4 per 100,000 and N=2,449, rate 33.1 per 100,000, respectively).
- The number of TBI-related hospitalizations among persons 65 years and older increased 65 percent (N=1,110, age-specific rate 134.4 per 100,000 and N=1,835, age-specific rate 214.1 per 100,000, respectively).

The reasons for these trend increases are not well understood.

Comparison to National Data and Benchmarks:

Table 2. Comparison of MA to U.S. TBI Data

	United States (2001)			Massachusetts Deaths (2002) Hospitalizations & ED Visits (2003)		
	Number	Crude Rate*	Age-Adjusted Rate* ‡	Number	Crude Rate*	Age-Adjusted Rate* ‡
Deaths	50,498	17.7	17.7	530	8.2	7.7
Non-fatal Hospitalizations	243,000 †	85.2	85.3	4,605	71.6	69.2
Non-fatal ED Visits	1,181,000 †	414.0	415.6	36,013	559.8	572.3
Total	1,475,000 †	516.9	518.9	41,148	639.6	649.6

U.S. Data Source: Centers for Disease Control and Prevention, Unpublished data, 2004.

* Rate per 100,000

2003 U.S. Census MA population estimates were used to calculate the MA rates.

‡ Age-adjusted to the 2000 U.S. standard population.

† US Hospitalizations, ED visits, and Total are rounded to the nearest thousand. Total may not add to sum due to rounding.

The U.S. Healthy People 2010 benchmark for non-fatal head injury hospitalizations is 45.0 per 100,000 (age-adjusted rate).⁷

References:

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2. Langlois, JA, Rutland-Brown, W, Thomas, KE. *Traumatic Brain Injury in the United States: Emergency Department Visits, Hospitalizations, and Deaths*. Atlanta (GA): Centers for Disease Control and Prevention, National Center for Injury Prevention and Control; 2004.
3. Centers for Disease Control and Prevention website. (www.cdc.org) accessed December 2004.
4. Thurman, DJ. *The epidemiology and economics of head trauma*. In: Miller, LP and Hayes, RL., eds. *Head trauma therapeutics: basic, pre-clinical and clinical aspects*. New York, NY. John Wiley and Sons; 2001.
5. LaVecchia F. *Final Report of the Massachusetts Traumatic Brain Injury Transition Project*; June, 1996.
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Resources for TBI Prevention and Services:

Injury Prevention and Control Program (IPCP)

Massachusetts Department of Public Health
Center for Community Health
Bureau of Family and Community Health
250 Washington Street, 4th Floor
Boston, MA 02108
(617) 624-5413
www.mass.gov/dph/fch/injury/index.htm

Statewide Head Injury Program (SHIP)

Massachusetts Rehabilitation Commission
27 Wormwood Street, Suite 600
Boston, MA 02210
(617) 204-3852 or 1-800-223-2559, ext. 2 (in MA)
TTY: (617) 204-3817
www.mass.gov/mrc/ship

Massachusetts Brain Injury Association

484 Main Street #325
Worcester, MA 01608
(508) 795-0244
(800) 242-0030 - Brain Injury Info Line
www.mbia.net

For further information, please contact:

Injury Surveillance Program (ISP)

Massachusetts Department of Public Health
Center for Health Information, Statistics, Research and Evaluation
250 Washington Street, 6th Floor
Boston, MA 02108
(617) 624-5648
www.mass.gov/dph/bhsre/isp/isp.htm